

# Understanding and modelling accessibility to public green in large urban centers using OpenStreetMap data

Speaker: Alice Battiston, PhD candidate in Modeling and Data Science @University of Turin

State of the Map 2022, Florence

21/08/2022



# Motivation



# Motivation



A collection of 17 interlinked global goals designed to be a "shared blueprint for peace and prosperity for people and the planet, now and into the future".

Set up in 2015 by the United Nations General Assembly and intended to be achieved by 2030.

# Motivation

## Target 11.7:

“By 2030, provide universal access to safe, inclusive and accessible, **green and public spaces**, in particular for women and children, older persons and persons with disabilities”.



Individual health  
benefits

Collective health  
spillovers

Positive  
environmental  
impact

# Motivation



- Monitoring
- Policy design

## How is it currently measured?

UN provide some guidelines on how to monitor the goal, but this is left to the single countries/cities with a very irregular monitoring.

GHS Urban Centres Database: 'generalised potential access to green areas'

- Uses satellite-based data on Normalized Difference Vegetation Index
- No notion of accessibility, private/public green

## Research questions

**RQ1:** Preliminary validation of OSM data using European satellite-based data on land use (urban atlas)

**RQ2:** Measure consistently accessibility to public green in large cities worldwide and build an interactive tool for policy makers

**RQ3:** Understanding the interplay between population distribution and accessibility

**RQ4:** Modeling the impact of different policy scenarios

# Why OpenStreetMap data?

**Green features:** simple identification of several types of green areas.

- Customizable selection of green areas based on key:value pairs
- Our -overall- selection:
  - ◆ 'leisure':['park', 'garden'],
  - ◆ 'landuse':['forest','grass', 'meadow', 'recreation\_ground']
  - ◆ 'natural':['wood', 'grassland', 'meadow']

# Why OpenStreetMap data?

**Green features:** simple identification of several types of green areas.

**Accessibility:** identification of accessible areas through key:value pairs and/or the street network.

- OSRM [Open Source Routing Machine] - to compute walking distances between residential locations and green areas
- Key: 'access' to identify accessible urban green areas

# Why OpenStreetMap data?

**Green features:** simple identification of several types of green areas.

**Accessibility:** identification of accessible areas through key:value pairs and\or the street network.

**Geographical coverage:** worldwide (potential)

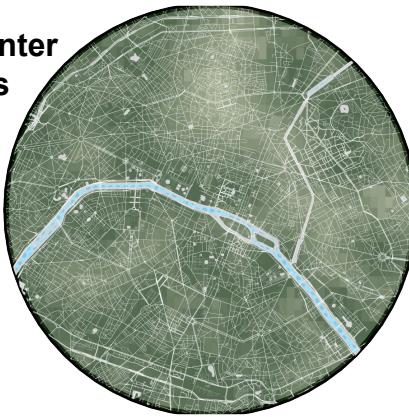
- OSM extracts for large urban centers following the GHS Urban Center Database definitions
- Largest 50 cities (with more than 100.000 inhabitants) for each country (~ 2500 urban centers)
- Population data from the Global Human Settlement - population layer, 9 arcsec resolution

# Our interactive tool

## Set parameters:

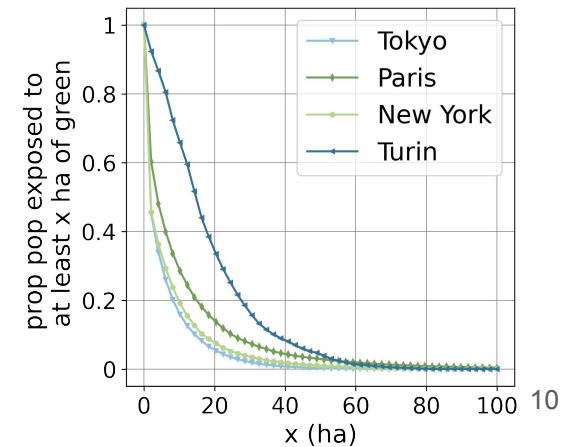
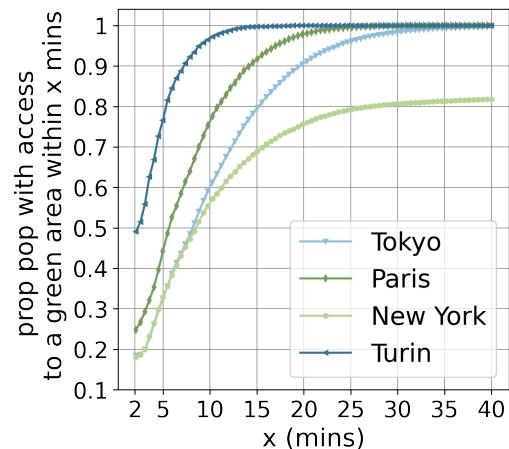
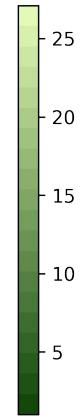
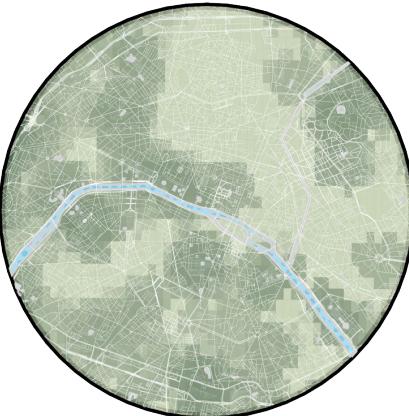
data source= OSM  
type of green= ['parks', 'forests',  
'grass','meadows']  
public green minimum size= 3  
ha  
type of distance matrix=  
street-network  
type of index= **Minimum  
Distance**

**City center  
of Paris**

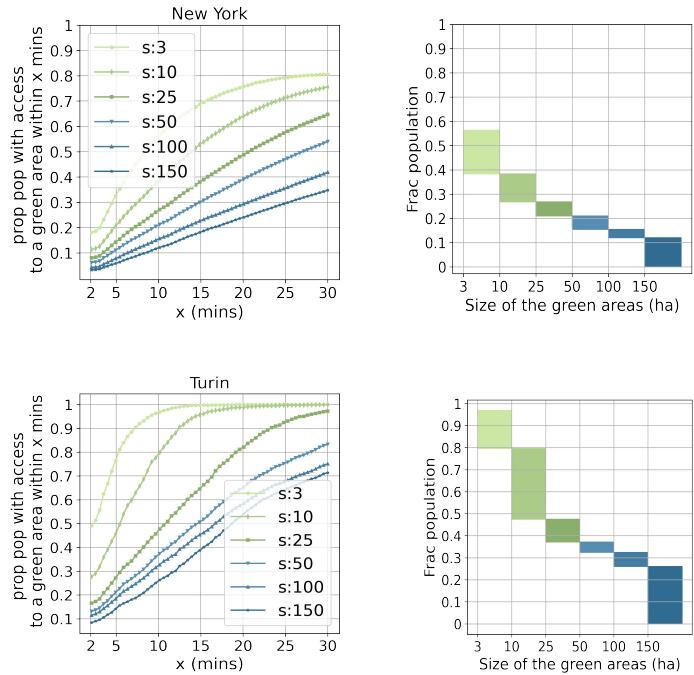
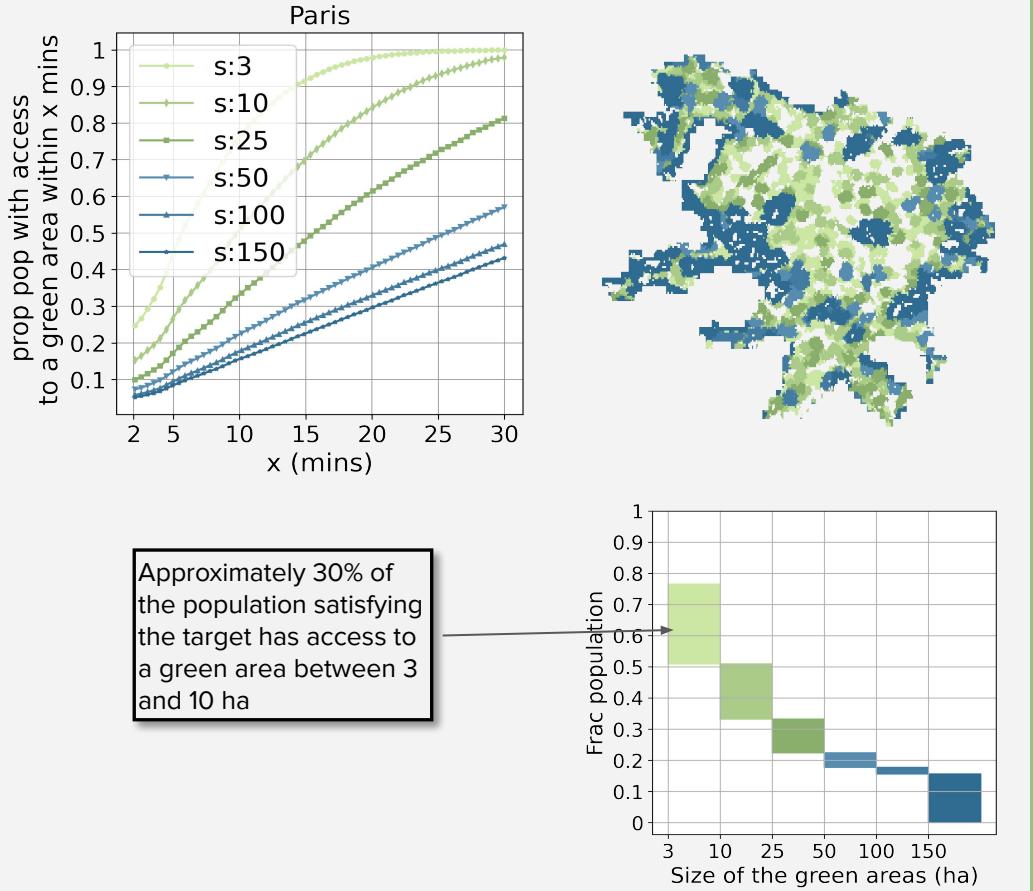


## Set parameters:

data source= OSM  
type of green= ['parks', 'forests',  
'grass','meadows']  
public green minimum size= 3 ha  
type of distance matrix=  
street-network  
type of index= **Total Exposure within  
10 mins (x mins)**

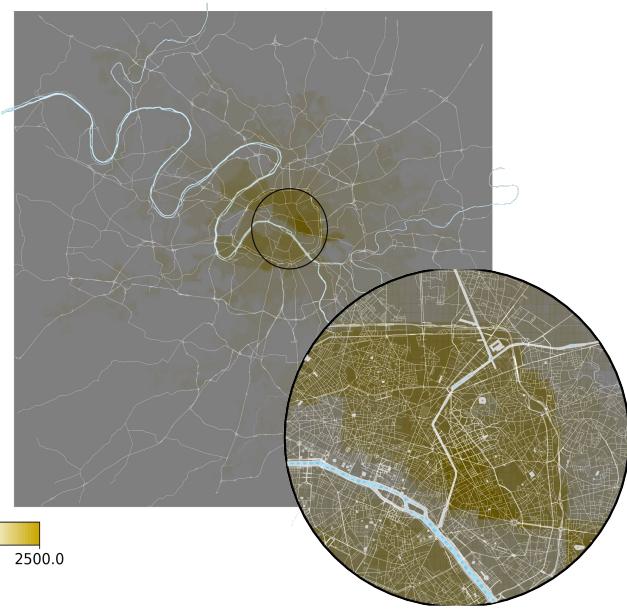


# Unveil the importance of small green areas



## Design policy scenarios

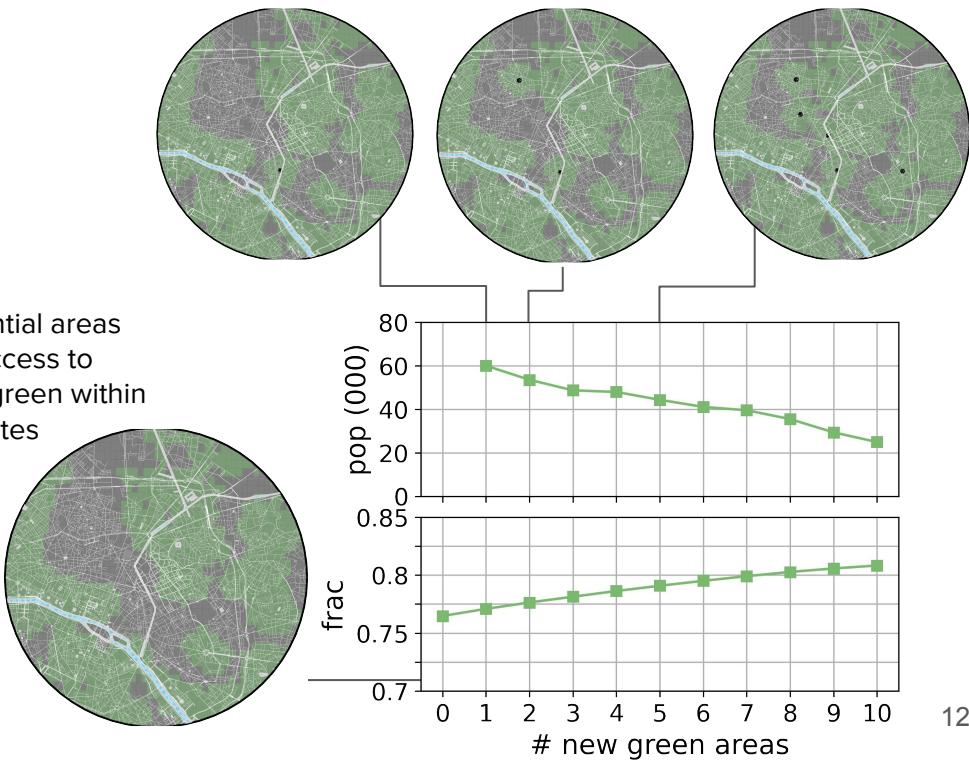
Selected scenario: Adding 10 optimally located public green areas in Paris



Residential areas  
what access to  
public green within  
10 minutes

### Objective:

Maximize share of population with access  
to a public green area of at least 3ha (4  
soccer courts) within 10 mins from the  
residential area



# Thank you!

All updates on the project will be published on the  
github repository:

<https://github.com/alibatti/AccessToGreenOSM>

Stay in touch and contact me:



[alice.battiston@unito.it](mailto:alice.battiston@unito.it)



@AliBattiston



@alibatti

The project is a joint project with  
my PhD advisor:



**Rossano Schifanella**  
University of Turin  
ISI Foundation